

Minnesota High School Robotics

Based on the FLL Challenge: OCEAN ODYSSEY

Version 1.0, Sept. 16, 2005

Version 2.0, Oct. 22, 2005

MISSIONS

Rescue the Submarine: The robot must rescue the Sub from Deep Water (see definition below and illustration). If the Sub is returned to Base, that is worth 40 points in the One Robot Division. If the robot is returned to the research vessel, that is worth 60 points in the One Robot Division. The Sub just needs to be on the vessel, location on the vessel or orientation does not matter, nor does the Sub have to be actually touching the deck of the vessel. To count for points as being returned to the research vessel, in either division, the robot must be on the vessel when returning the Sub. The Sub may be returned to Base and subsequently returned to the research vessel. Points are determined by the final location.

In the Two Robot Division, the sub must be rescued from the Deep Water by the Deep Water Robot and returned to Base or the research vessel by the Cargo Robot. Returning the Sub to Base is worth 60 points and to the vessel is worth 80 points.

The Sub will be placed randomly completely within the boundary of the Deep Water.

Conduct a Transect Mapping: To show the location of the ancient shipwreck, the robot must flip transect Flags up. Any number of Flags up at all (of any color) is worth 30 points, and each complete east/west row is worth an additional 15 points.

Protect the Pump Station: The robot must get the Protective Structure to straddle the Pump Station, with at least one of the Protective Structure's foot pads completely past the Pump Station's south wall. This result is worth 40 points.

Service the Pipeline: The robot must install the new segment of pipe so that the team can test the line. When the segment is installed, the robot must provide force at the east end to raise the yellow flags. The yellow flags raised are worth 40 points.

Sample One Species From Among Others: The robot must tag the grey Fish only. The grey Fish must be out of alignment with its location mark in some way and all green Fish must remain aligned with theirs. This result is worth 40 points. The location of the fish will be random (the grey fish may be in any of the 4 fish positions) and decided just before the match.

Release the Dolphin: The robot must get the Dolphin back into the ocean. The Dolphin touching blue on the mat is worth 25 points.

Decide About an Artificial Reef: The robot must move the black structural debris either to shallow water, as an Artificial Reef, or to Base, as recyclable material. The Reef touching shallow water (the lighter blue shade on the mat) or at Base is worth 25 points.

Clean Up a Cargo Shipping Accident: The robot must get the Shipping Container and its spilled Crates of plastic bags to Base so they don't harm any wildlife. The Shipping Container at Base is worth 30 points. As Bonus Objects, all Crates are worth points anywhere on the table. Crates at Base are worth 5 points each, and other Crates on the table are worth 2 points each. When removing a Crate, the referee takes the one farthest west at that time.

Find and Recover Archaeological Artifacts: The robot must get the Artifacts completely off the outline of the ancient shipwreck for 25 points, or back to Base for 45 points (One Robot Division) or back to Base for 75 points (Two Robot Division). In the Two Robot division the Artifact must be removed from the shipwreck outline by the Deep Water Robot and returned to base by the Cargo Robot.

"Same Day Mission": There will be a mission announced the morning of the tournament. There will be a working time in the morning for all teams to work on this mission.

Bonus Points

Head to Head placements.

- **1st Place.** 50 points added to best score in Head to Head.
- **2nd Place.** 30 points added to best score in Head to Head.
- **3rd place.** 20 points added to best score in Head to Head.
- **4th place.** 10 points added to best score in Head to Head.

Further Definitions

Deep Water. Deep Water is defined as the darker blue area (there are three colors, an aquamarine outer layer, a thin dark blue layer, then the central area of darker blue) near the western end of the pipeline. Only the central area of darker blue north of the pipeline is considered Deep Water. See Illustration of Deep Water.

Two Robot Division Definitions:

Deep Water robot: The Deep Water robot is the robot that must initially touch and move the Artifact and the Sub. It cannot return these items to base. The Deep Water robot must meet the robot definition rules and operates out of the Base per normal Base rules. It can complete any of the other missions completely besides the Sub and Artifact missions.

Cargo Robot: The Cargo Robot is the robot that must retrieve the Artifact directly from the Deep Water Robot, or from a location outside the Deep Water (for the Sub) or shipwreck (artifact) where these items were left by the Deep Water Robot. This transfer/pickup must be outside the base (both robots outside the base). The Cargo robot must meet the robot definition rules and operates out of the Base per normal Base rules. It can complete any of the other missions completely besides the Sub and Artifact missions.

Bonus objects. These are treated the same, either robot incurring a robot return penalty will lose a Bonus Object.

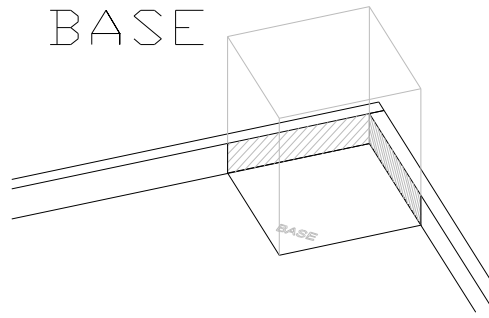
Rules

Please see the FLL Robot Rules (at www.firstlegoleague.org). All rules apply here with the following exceptions:

6. MATERIALS: EVERYTHING the team brings with it to the COMPETITION AREA of a tournament must be made entirely of LEGO elements in original factory condition. Electrical parts are limited in type and quantity to \pm 2 RCXs, ~~1 rotation sensor, 2 touch sensors, 2 light sensors, 3 motors, 1 lamp, 6 AA batteries. Wires are not limited.~~ Stickers, paint, tape, glue, oil, etc. are not allowed, except marker can be used for owner identification in hidden areas only. This rule applies only to the competition area (except remote controls are not allowed anywhere).

In the Two Robot division, the team may have two independent robots, defined as above. Each Robot may have 2 RCXs.

7. BASE: Base is an imaginary hollow shape formed by vertical walls that rise from the perimeter of the Base's footprint (including the inside surfaces of the border walls), and by an invisible ceiling 16in (40cm) high. NOTE: Base is a VOLUME--not an area.



In the Two Robot Division, both robots use the Base and all rules apply to each Robot.

34. SOFTWARE: ~~The robot must be programmed using LEGO MindStorms Robotics Invention System or RoboLab software (any version).~~ There are no restrictions on what software is used to program the robot.

36. CHALLENGE QUESTIONS/SUPPORT: For official answers to questions about the HSR challenge, contact Fred Rose @ fredrose@hightechkids.org (preferred) or at 612-386-7106. ~~Robot Game part of the Challenge, including rulings on special strategies or situations, e-mail flitech@usfirst.org (most efficient) or call 1-800-871-8326, x118 (less efficient).~~ For best results, be sure you've read the four documents listed above, under the rule READ THIS FIRST. When e-mailing, be sure to put "Challenge" in the subject line, and please state your role on the team (member, coach, parent, mentor). When calling, please leave your contact information slowly, your role on the team, and YOUR QUESTION on voicemail. NOTE: flitech does not answer questions about building or programming the robot. NOTE: The FLL International Forum is great for sharing ideas, but it is NOT A RELIABLE SOURCE OF ANSWERS about the Challenge.

37. FULL DISCLOSURE/TRANSPARENCY: Since individual victory need not come at the expense of collective excellence, all official answers given to teams through Challenge support are subject to public posting in the Q&A, including answers about ALLOWABLE strategies. Also, the only documents given to the refs for reference to conduct matches and make calls are the same 4 documents you and every other team have access to all season. So if a strategy is questionable for you, chances are it will be questionable for the ref too, and guarding it until the tournament is risky.

Awards

Presentation Award. This award is based on the Research and Design Presentation. This award is split into two pieces, each worth 50% of the award.

- Design Presentation. This portion is based on the design and strategy for the robot designed by the team for the competition. The judges will be looking for answers to the following questions:
 - What were the requirements for your robot? (in other words, what was the problem you were trying to solve.)
 - How did those requirements drive your design and mission strategy? (your solution)
 - What other designs did you consider?
 - How did you evaluate your implemented design against your requirements and how did your design subsequently change?
 - How did the team manage itself (roles, schedule, etc.)
- Research Presentation. This portion is based on research into a real world problem.

- Hurricane Katrina caused significant damage to the Gulf Coast oil and gas industry infrastructure. Two missions from the HSR challenge (Service the Pipeline and Protect the Pumping Station) are directly related to this. Please investigate the issues surrounding protection and repair of the Gulf Coast drilling platforms, pumping stations, and underwater pipelines. Propose a solution that would mitigate the damage and make repairs easier and faster.
 - Clearly define what you believe the problem(s) to be.
 - Define constraints (economic, social, environmental, etc.)
 - Clearly articulate your proposed solution (s).
 - State obstacles to implementing your solution (s).
- One week prior to the competition, an electronic document highlighting both the Design and Research Presentation is due. This may be a Word document or a PowerPoint document. There will be a penalty of 25% of the the Research and Presentation score if this deadline is not met. The team may add more material to their presentation after this date and present that at the competition. There is no format or minimum content defined. This is up to the team’s judgment but the purpose of this is to give judges sufficient time to review the solution.

The remaining awards are listed below. Please note this is subject to change and input on this is welcomed. These awards would be by division. In other words, these awards would be given to teams in One Robot Division and Two Robot Division.

As done last two years with the Director’s Award winner in High School FLL, a scholarship will be given to the winning team. That means winning team in One Robot division and Two Robot division. These amounts will be announced shortly.

Award	What is it?	Why?	Percentage of total (master score)
Judges	Whatever judges want	Because there always seems to be a need for this. Only a trophy.	0
Design	Judging evaluation of design of robot (Design includes mechanical design and programming)	Only a trophy, not part of the overall score. A good design should result in a good score on the missions.	0
Team Management	Teamwork, team/project management. 50% of this award is based on observation of team solving the same day mission, 50% on how the team managed themselves during the season (per questions).	Expand teamwork to include project mgmt and also a view into how the team handled the same-day mission. No trophy, only counts towards score.	10
Presentation	Presentation of design, strategy, management, real world applicability	Presenting your view, explaining what you did is important.	20
Robot Seeding	Best score from seeding rounds (2 rounds)	No trophy for this.	10
Robot Challenge	Result from head to head	Head to Head now counts	60

	challenge. Best score plus bonus. (add a bonus for top 4 places – 1 st 50, 2 nd 30, 3 rd 20, 4 th 10; this would be added to your best score).	for something. Getting the robot to perform is one of the prime objectives of the competition.	
Champion	Winner of Master score total	We need a winner.	100

Illustration of Deep Water:

